

## SWIRLS: GPS/GALILEO Dual-frequency Receiver

*The SWIRLS project is a complete receiver development program: starting from user requirements for specific applications generated by experienced client partners, a full capability receiver prototype is designed, implemented and tested in its entirety. Parallel research and development activities in the course of the project investigate new receiver technologies for GPS/Galileo receiver applications in a professional market.*



### Background

The SWIRLS project is one of the projects that started under the 2nd call of the 6<sup>th</sup> Framework Programme for Galileo Research and Development. It is coordinated by Septentrio and is partially funded by the European GNSS Supervisory Authority. SWIRLS consists of a consortium of nine European partners:

- **Prime:** Septentrio Satellite Navigation (B)
- **Partners:** Orban Microwave Technology (B), GMV (E), Skysoft (PT), Technische Universiteit Delft (NL), E.ON-Ruhrgas (D), Allsat (D), VUGTK (CZ), Satimo (F)

### Project objectives

The objective of the SWIRLS project is to build the first GPS/Galileo receiver for professional users (RTK, surveying, geodesy, etc...). As a criterion for the most relevant applications, the consortium has selected applications where the receiver performance benefits mostly from an increased number of satellites simultaneously in view, which is obtained by combining GPS and Galileo while offering integrity services to ensure a correct operation of the application. Two applications have been targeted:

- (permanent) control networks for geodetic/geodynamics/research applications
- reference stations/rovers for applications such as RTK, DGPS, etc...

The end goal is to realize a prototype receiver for these two applications.

### Main activities

- Investigation and research on receiver core technologies relevant to professional users (including antenna technology, interference and multipath mitigation, etc...). The goal is also to identify new techniques or algorithms for the professional receivers (for both targeted applications).
- Development of hardware and software components.
- Development of a simulator, test tools and validation tools.

### Prototype development

First, the User Requirements are defined, based on end-user experiences and general market know-how of the partners.

The derived specifications serve as input for the architectural and research activities, after which the prototype is developed. The prototype is then integrated, internally tested and validated. Finally, the market partners subject the receiver prototype to application testing.

The following phases are not part of the project but the next goal is to realize a commercial product. The prototype will be upgraded with the necessary modifications resulting from the test results, a pre-series will be produced and finally the product will be commercialised.

### Features

- Dual-frequency L1/E5a code/carrier tracking of GPS and Galileo signals
- Differential GNSS and RTK capabilities
- EGNOS and WAAS compatible
- Three serial and 1 full speed USB port
- Available as OEM board or, for ready-to-use solutions, in a waterproof IP65 rugged enclosure
- Base station antenna and rover antenna
- Intuitive GUI for its configuration, for logging and remote control



## SEPTENTRIO PRODUCTS

**AsteRx1** - Compact single-frequency GNSS receiver platform, offering top-quality GPS code and carrier phase data and single frequency positioning (including DGPS and L1-RTK) at up to 50 Hz, with a seamless upgrade possibility to Galileo.

**AsteRx2** - Compact dual-frequency GNSS receiver platform, offering top-quality GPS and GLONASS code and carrier phase data and dual-frequency positioning (including DGPS and L1/L2-RTK) at up to 20 Hz.

**PolaRx2e and PolaRx2e\_OEM** - Dual-frequency GNSS receiver platform for high-end applications.

**PolaRx2eH and PolaRx2e@** - A unique single-board dual-frequency multi-antenna receiver that can be connected to 2, respectively 3 antennas, for various machine control, heading/attitude and other multi-antenna applications.

**PolaRx2C** - The PolaRx2C can track up to 4 satellites in L2C mode. For these satellites, the CA, P1, P2 and L2C measurements are available simultaneously.

**GeNeRx1** - A combined scientific GPS/Galileo receiver, which can be flexibly configured to simultaneously track Galileo as well as GPS satellites in multi-frequency mode. All Galileo frequencies and modulations are supported.

**PolaNt** - A lightweight precise positioning and survey single or dual-frequency antenna for use with the PolaRx family.

**RxControl** - RxControl is an intuitive user interface to configure and control all types of PolaRx receivers and monitor, log and post data remotely.

**RxMobile** - A unique intuitive, portable GUI field controller for the PolaRx receivers. RxMobile allows controlling the receiver, monitoring the navigation solution and accessing its functions in the field in the same intuitive way as with RxControl.



### Contact information

Swirls Project Manager: Alain Suskind  
Ubicenter  
Philipssite 5  
B - 3001 Leuven  
Belgium  
Tel: +32 (0) 16 300 800  
Fax: +32 (0) 16 221 640  
[www.septentrio.com](http://www.septentrio.com)  
[fp6@septentrio.com](mailto:fp6@septentrio.com)

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Headquarters :  
Ubicenter, Philipssite 5  
B-3001 Leuven  
Belgium

Phone: +32 16 300 800  
Fax: +32 16 221 640  
[info@septentrio.com](mailto:info@septentrio.com)  
[www.septentrio.com](http://www.septentrio.com)

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